

CLAIMS

① AB
2) (A) 1) AGC
AFC
EQ
3) (B)
4) AGC
3) AFC
+ EQ

1. A path search method for detecting
respective timings of path components included a
5 signal received via a multipath propagation path,
said method comprising the steps of:
a first path search step for detecting
respective timings of path components using pilot
symbols of a known phase included in said signal
10 received via the multipath propagation path; and
a second path search step for detecting
respective timings of path components using
information symbols derived from a signal
demodulated according to said timings detected in
15 the first path search step and said pilot symbols of
a known phase.

2. The path search method as claimed in
claim 1, wherein said information symbols derived
20 from the signal demodulated according to the timings
detected in the first path search step are generated
by implementing the steps of:

despreading said signal received via the
multipath propagation path according to said timings
25 detected in the first path search step;

cophasing and summing the information
symbols despreaded according to said respective path
timings in a symbol by symbol manner;

demodulating and implementing data
30 decision of said cophased and summed respective
information symbols; and

remodulating said data decision signal.

3. The path search method as claimed in
35 claim 2, wherein said information symbols derived
from the signal demodulated according to the timings
detected in the first path search step are selected

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and fed back such that information symbols satisfying a predetermined condition are selected.

5 4. The path search method as claimed in claim 1, wherein said second path search step is repeated until a predetermined condition is satisfied.

10 5. The path search method as claimed in claim 1, wherein said signal received via the multipath propagation path is transmitted in accordance with a multicarrier code division multiplex system.

15 6. A channel estimation method for estimating channel variation using pilot symbols, said method comprising:
a pilot symbol acquiring step for acquiring pilot symbols of a known phase included in
20 received packets; and
a channel estimation step for implementing channel estimation using said acquired pilot symbols.

25 7. The channel estimation method as claimed in claim 6, wherein said pilot symbols of a known phase are time-multiplexed with the packets.

30 8. The channel estimation method as claimed in claim 6, wherein said pilot symbols of a known phase are code-multiplexed with the packets.

35 9. The channel estimation method as claimed in claim 1, wherein said channel estimation step implements channel estimation by combining said pilot symbols of a known phase and pilot symbols included in other packets transmitted from the same transmission source.

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10. A channel estimation method for estimating channel variation using pilot symbols, said method comprising:

5 a pilot symbol acquiring step for acquiring pilot symbols of a known phase included in a common control channel in a multiplexed manner; and

10 a channel estimation step for implementing channel estimation using said acquired pilot symbols.

11. The channel estimation method as claimed in claim 10, wherein said pilot symbols of a known phase are time-multiplexed with the common control channel.

12. The channel estimation method as claimed in claim 10, wherein said pilot symbols of a known phase are code-multiplexed with the common control channel.

13. The channel estimation method as claimed in claim 10, wherein said channel estimation step implements channel estimation by combining said pilot symbols of a known phase and pilot symbols included in other packets transmitted from the same transmission source.

14. A channel estimation method for estimating channel variation using pilot symbols, said method comprising:

30 a first pilot symbol acquiring step for acquiring pilot symbols of a known phase included in packets and in a common control channel in a multiplexed manner;

35 a second pilot symbol acquiring step for acquiring pilot symbols of a known phase included in

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said common control channel; and

a channel estimation step for implementing channel estimation using said acquired pilot symbols.

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15. A channel estimation method for estimating channel variation using pilot symbols, said method comprising:

10 a pilot symbol acquiring step for acquiring pilot symbols of a known phase included in a received packet;

a tentative channel estimation step for implementing tentative channel estimation using said acquired pilot symbols;

15 a tentative data decision information symbol generating step for compensating for the channel variation in accordance with a result of said tentative channel estimation and generating tentative data decision information symbols from the compensated information symbols; and

20 a channel estimation step for generating information symbols wherefrom modulation components are removed using said tentative data decision information symbols and implementing channel estimation using said pilot symbols and information symbols.

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16. The channel estimation method as claimed in claim 15, wherein said tentative data decision information symbol generating step includes
30 a weighting process for weighting said tentative data decision information symbols according to the reliability.

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17. The channel estimation method as claimed in claim 15, wherein said tentative data decision information symbol generating step includes an error correction process for error correction

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decoding said tentative data decision information symbols after error correction encoding again.

18. The channel estimation method as claimed in claim 17, wherein said tentative data decision information symbol generating step includes a weighting process for weighting said error correction coded tentative data decision information symbols according to the reliability.

19. A channel estimation method for estimating channel variation using pilot symbols, said method comprising:

a subcarrier acquiring step for acquiring a plurality of subcarriers included in received packets;

a pilot symbol acquiring step for acquiring a plurality of pilot symbols of a known phase included in said plurality of subcarriers, respectively; and

a channel estimation step for implementing channel estimation for each of said subcarriers using said plurality of pilot symbols.

20. A communication device comprising:
path search means for detecting respective timings of path components included in a reception signal received via a multipath propagation path using pilot symbols of a known phase included in said reception signal; and
channel estimation means for estimating channel variation using said pilot symbols.

21. The communication device as claimed in claim 20, wherein said path search means includes:
a first path search part for detecting respective timings of path components using said

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pilot symbols; and

a second path search part for detecting
respective timings of path components using an
information symbols derived from a signal
5 demodulated according to said timings detected in
the first path search part and said pilot symbols.

22. The communication device as claimed in
claim 20 or 21, wherein said channel estimation
10 means includes:

a pilot symbol acquiring part for
acquiring pilot symbols included in said reception
signal; and

a channel estimation part for implementing
15 channel estimation using said acquired pilot symbols.

23. The communication device as claimed in
claim 22, wherein said channel estimation part
includes:

20 a tentative channel estimation part for
implementing tentative channel estimation using said
acquired pilot symbols;

a tentative data decision information
symbol generating part for compensating for the
25 channel variation in accordance with a result of
said tentative channel estimation and generating a
tentative data decision information symbols from the
compensated information symbols; and

a channel estimation part for generating
30 an information symbol wherefrom modulation
components are removed using said tentative data
decision information symbols and implementing
channel estimation using said pilot symbols and
information symbols.

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24. The communication device as claimed in
claim 22,

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wherein said pilot symbol acquiring part includes:

a subcarrier acquiring part for acquiring a plurality of subcarriers included in said reception signal; and

a pilot symbol acquiring step for acquiring a plurality of pilot symbols of a known phase included in said plurality of subcarriers, respectively, and,

wherein said channel estimation part implements channel estimation for each of said subcarriers using said plurality of pilot symbols.

25. A communication device for implementing path search for detecting respective timings of path components included a signal received via a multipath propagation path, said device comprising:

a first path search part for detecting respective timings of path components using pilot symbols of a known phase included in said signal received via the multipath propagation path; and

a second path search part for detecting respective timings of path components using an information symbols derived from a signal demodulated according to said timings detected in the first path search step and said pilot symbols of a known phase.

26. A communication device for implementing channel estimation for estimating channel variation using pilot symbols, said device comprising:

a pilot symbol acquiring part for acquiring pilot symbols of a known phase included in received packets; and

a channel estimation part for implementing

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channel estimation using said acquired pilot symbols.

27. A communication device for
implementing channel estimation for estimating
5 channel variation using pilot symbols, said device
comprising:

a pilot symbol acquiring part for
acquiring pilot symbols of a known phase included in
a common control channel in a multiplexed manner;
10 and

a channel estimation part for implementing
channel estimation using said acquired pilot symbols.

28. A communication device for
15 implementing channel estimation for estimating
channel variation using pilot symbols, said device
comprising:

a first pilot symbol acquiring part for
acquiring pilot symbols of a known phase included in
20 packets and in a common control channel in a
multiplexed manner;

a second pilot symbol acquiring part for
acquiring pilot symbols of a known phase included in
said common control channel; and

25 a channel estimation part for implementing
channel estimation using said acquired pilot symbols.

29. A communication device for
implementing channel estimation for estimating
30 channel variation using pilot symbols, said device
comprising:

a pilot symbol acquiring part for
acquiring pilot symbols of a known phase included in
received packets;

35 a tentative channel estimation part for
implementing tentative channel estimation using said
acquired pilot symbols;

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a tentative data decision information symbol generating part for compensating for the channel variation in accordance with a result of said tentative channel estimation and generating a tentative data decision information symbols from the compensated information symbols; and

a channel estimation part for generating information symbols wherefrom modulation components are removed using said tentative data decision information symbols and implementing channel estimation using said pilot symbols and information symbols.

30. A communication device for implementing channel estimation for estimating channel variation using pilot symbols, said device comprising:

a subcarrier acquiring part for acquiring a plurality of subcarriers included in received packets;

a pilot symbol acquiring part for acquiring a plurality of pilot symbols of known phases included in said plurality of subcarriers, respectively; and

a channel estimation part for implementing channel estimation for each of said subcarriers using said plurality of pilot symbols.

31. A communication device comprising:
path search means for performing a first path search step in which respective timings of path components are detected using pilot symbols of a known phase included in a reception signal received via a multipath propagation path; and
channel estimation means for performing a first channel estimation step in which channel estimation is implemented for estimating channel

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variation after said first path search step,

wherein said path search means implements a second path search step in which respective timings of path components are detected using information symbols derived from a signal demodulated after said first channel estimation step according to said timings detected in the first path search step and said pilot symbols of a known phase, and

wherein said channel estimation means implements a second channel estimation step in which channel estimation is implemented for estimating channel variation using information symbols derived from a signal demodulated after said first channel estimation step according to said timings detected in the second path search step and said pilot symbols of a known phase, and thereafter, recursively implementing path search and channel estimation by repeating the processes of implementing said second path search step using said information symbols demodulated after said second channel estimation step and pilot symbols and implementing said second channel estimation step using information symbols fed back in accordance with the timing detected in said second path search step and pilot symbols.

32. The communication device as claimed in claim 31, wherein said pilot symbols are included in at least one of packets and a common control channel of said received signal.

33. The communication device as claimed in claim 32, wherein said pilot symbols are multiplexed with at least one of said packets and said common control channel.

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34. A communication device comprising path search and channel estimation means for implementing at least one of path search and channel estimation using pilot symbols of a known phase or information symbols included in at least one of packets and a common control channel of a received signal.

35. The communication device as claimed in claim 34, wherein said pilot symbols are included in at least one of packets and a common control channel of said received signal.

36. The communication device as claimed in claim 34 or 35, further comprising feedback means for feeding back said information symbol, wherein said path search and channel estimation means recursively implements path search and channel estimation by repeating processes of implementing path search using information symbols decoded after channel estimation and pilot symbols and implementing channel estimation using information symbols fed back via said feedback means in accordance with a timing detected in said path search and pilot symbols.

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